

## TENT COOPERATION TRE Y

PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents  
 United States Patent and Trademark  
 Office  
 Box PCT  
 Washington, D.C.20231  
 ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

<b>Date of mailing (day/month/year)</b> 26 August 1999 (26.08.99)	<b>Applicant's or agent's file reference</b> PDC/AB/20432
<b>International application No.</b> PCT/IB99/00288	<b>Priority date (day/month/year)</b> 16 February 1998 (16.02.98)
<b>International filing date (day/month/year)</b> 08 February 1999 (08.02.99)	
<b>Applicant</b> HAMERY, Dominique	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:  
 05 August 1999 (05.08.99)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO  
 34, chemin des Colombettes  
 1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

C. Carrié

Telephone No.: (41-22) 338.83.38

09/622246

26X1

PATENT COOPERATION TREATY

2615

PCT

From the INTERNATIONAL BUREAU

NOTIFICATION OF THE RECORDING  
OF A CHANGE

(PCT Rule 92bis.1 and  
Administrative Instructions, Section 422)

To:

COZENS, Paul, Dennis  
Mathys & Squire  
100 Grays Inn Road  
London WC1X 8AL  
ROYAUME-UNI

Date of mailing (day/month/year) 08 August 2000 (08.08.00)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference PDC/AB/20432	
International application No. PCT/IB99/00288	International filing date (day/month/year) 08 February 1999 (08.02.99)

1. The following indications appeared on record concerning:		
<input checked="" type="checkbox"/> the applicant	<input checked="" type="checkbox"/> the inventor	<input type="checkbox"/> the agent <input type="checkbox"/> the common representative
Name and Address HAMERY, Dominique 3, Parc de la Bérengère F-92210 Saint Cloud France	State of Nationality FR	State of Residence FR
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	
2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:		
<input type="checkbox"/> the person	<input type="checkbox"/> the name	<input checked="" type="checkbox"/> the address <input type="checkbox"/> the nationality <input type="checkbox"/> the residence
Name and Address HAMERY, Dominique 27 Boulevard Edmond Rostand F-92500 Rueil Malmaison France	State of Nationality FR	State of Residence FR
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	
3. Further observations, if necessary:		
4. A copy of this notification has been sent to:		
<input checked="" type="checkbox"/> the receiving Office	<input type="checkbox"/> the designated Offices concerned	
<input type="checkbox"/> the International Searching Authority	<input checked="" type="checkbox"/> the elected Offices concerned	
<input type="checkbox"/> the International Preliminary Examining Authority	<input type="checkbox"/> other:	

RECEIVED

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer I. Britel Telephone No.: (41-22) 338.83.38	DEC 07 2000 Technology Center 2600.
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REC'D 19 JUN 2000

WIPO

PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference PDC/AB/20432	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/IB99/00288	International filing date (day/month/year) 08/02/1999	Priority date (day/month/year) 16/02/1998
International Patent Classification (IPC) or national classification and IPC H04N7/00		
Applicant CANAL+ SOCIETE ANONYME et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 6 sheets, including this cover sheet.

- ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 05/08/1999	Date of completion of this report 15.06.2000
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Revellio, S Telephone No. +49 89 2399 8973 

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/IB99/00288

**I. Basis of the report**

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

**Description, pages:**

1-19 as originally filed

**Claims, No.:**

1-18 as originally filed

**Drawings, sheets:**

1/5. - 5/5 as originally filed

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:  
☐ the claims, Nos.:  
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

**III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

- ☐ the entire international application.  
☒ claims Nos. 17, 18.

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/IB99/00288

because:

- ☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):
  
- ☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 17, 18 are so unclear that no meaningful opinion could be formed (*specify*):  
  
**see separate sheet**
  
- ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.
  
- ☐ no international search report has been established for the said claims Nos. .

## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

### 1. Statement

Novelty (N)	Yes:	Claims
	No:	Claims 1, 16
Inventive step (IS)	Yes:	Claims
	No:	Claims 2-15
Industrial applicability (IA)	Yes:	Claims 1-16
	No:	Claims

### 2. Citations and explanations

**see separate sheet**

## VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

**see separate sheet**

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/IB99/00288

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**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

**see separate sheet**

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/IB99/00288

The following document is referred to in this communication; the numbering will be adhered to in the rest of the procedure:

D1: US-A-5 633 654 (KENNEDY JR HOWARD J ET AL) 27 May 1997

**Section V:**

1. Claims 1, 16:

Document D1 is regarded as being the closest prior art to the subject-matter of claim 1, this document shows (the references in parentheses applying to this document) a decoder (see fig. 3 and col. 4, lines 25 to 59) for a digital audiovisual transmission system with two memories, one storage memory allocated to receive decompressed still picture image data (see step 308 in fig. 3 and column 4, lines 38, 39) and one display memory adapted to hold contemporaneously data representing multiple still picture images (see step 310 in fig. and col. 4, lines 50 to 52 and "video system 100 is capable of displaying video images on monitor 108 during capture and compression precessing", see col. 4, lines 8 to 10).

Since all features of claim 1 are considered to be disclosed in document D1, the requirements with respect to novelty are not met for the subject-matter claimed in claim 1 (Art. 33(2) EPC). The same objection applies likewise against method claim 16.

2. Claims 2 to 15:

The additional features of claim 2 to 15 are either known from the prior art documents cited in the International Search Report or generally known in the technical field of image decoding and display and the inclusion of such features is regarded as part of the customary praxis the skilled person would consider in accordance with circumstances.

Hence, the subject-matter of claims 2 to 15 is not considered to be novel or does not involve an inventive step as required by Articles 33(2) and (3) PCT.

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/IB99/00288

3. Claims 1 to 16 have industrial applicability as required in accordance with Art. 33(4) PCT since the subject-matter claimed can be made or used in industry.

**Section VII:**

1. The apparatus claim 1 is not drafted in the correct two-part form with all the features of the closest prior art document (at present document D1) being comprised in the generic part of the claim (Rule 6.3(b)(i) PCT) and with the remaining features being included in a characterising part (Rule 6.3(b)(ii) PCT).
2. The opening pages of the description do not provide an acknowledgment of the prior art (Rule 5.1(a)(ii) PCT) as disclosed in document D1 noted above.
3. Bracketed reference numerals are not included throughout the claims (Rule 5.1(a)(v) PCT).

**Section VIII:**

Claims 17 and 18:

Since claims 17 and 18 do not contain any technical feature, the subject-matter for which protection is sought is considered to be vague and therefore unclear. Therefore, claims 17 and 18 in their present form cannot be allowed because of lack of clarity (Art. 6 PCT).

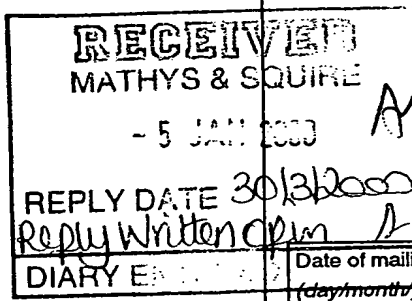


# PATENT COOPERATION TREATY

From the:  
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

## PCT

To:  
COZENS, P.  
MATHYS & SQUIRE  
100 Gray's Inn Road  
London WC1X 8AL  
GRANDE BRETAGNE



WRITTEN OPINION

(PCT Rule 66)

Applicant's or agent's file reference <b>PDC/AB/20432</b>		<b>REPLY DUE</b> within 3 month(s) from the above date of mailing
International application No. <b>PCT/IB99/00288</b>	International filing date (day/month/year) <b>08/02/1999</b>	Priority date (day/month/year) <b>16/02/1998</b>
International Patent Classification (IPC) or both national classification and IPC <b>H04N7/00</b>		
Applicant <b>CANAL+ SOCIETE ANONYME et al.</b>		

1. This written opinion is the **first** drawn up by this International Preliminary Examining Authority.
2. This opinion contains indications relating to the following items:
  - I ☒ Basis of the opinion
  - II ☐ Priority
  - III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
  - IV ☐ Lack of unity of invention
  - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability: citations and explanations supporting such statement
  - VI ☐ Certain document cited
  - VII ☒ Certain defects in the international application
  - VIII ☒ Certain observations on the international application
3. The applicant is hereby **invited to reply** to this opinion.
 

**When?** See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).

**How?** By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

**Also:** For an additional opportunity to submit amendments, see Rule 66.4.  
For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 bis.  
For an informal communication with the examiner, see Rule 66.6.

**If no reply is filed,** the international preliminary examination report will be established on the basis of this opinion.
4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is: **16/06/2000.**

Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer / Examiner <b>Revellio, S</b>  Formalities officer (incl. extension of time limits) <b>Schaller, W</b> Telephone No. +49 89 2399 4409
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**I. Basis of the opinion**

1. This opinion has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed".*).

**Description, pages:**

1-19 as originally filed

**Claims, No.:**

1-18 as originally filed

**Drawings, sheets:**

1/5,3/5-5/5 as originally filed

2/5 as received on 04/03/1999 with letter of 26/02/1999

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:  
☐ the claims, Nos.:  
☐ the drawings, sheets:

3. This opinion has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

**III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been and will not be examined in respect of:

- ☐ the entire international application,  
☒ claims Nos. 17, 18,

because:

- ☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):
- ☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 17, 18 are so unclear that no meaningful opinion could be formed (*specify*):  
**see separate sheet**
- ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.
- ☐ no international search report has been established for the said claims Nos. .

**V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Claims 1, 16
Inventive step (IS)	Claims 2-15
Industrial applicability (IA)	Claims

**2. Citations and explanations**

**see separate sheet**

**VII. Certain defects in the international application**

The following defects in the form or contents of the international application have been noted:

**see separate sheet**

**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

**see separate sheet**

The following document is referred to in this communication; the numbering will be adhered to in the rest of the procedure:

D1: US-A-5 633 654 (KENNEDY JR HOWARD J ET AL) 27 May 1997

**Section V:**

1. Claims 1, 16:

Document D1 is regarded as being the closest prior art to the subject-matter of claim 1, this document shows (the references in parentheses applying to this document) a decoder (see fig. 3 and col. 4, lines 25 to 59) for a digital audiovisual transmission system with two memories, one storage memory allocated to receive decompressed still picture image data (see step 308 in fig. 3 and column 4, lines 38, 39) and one display memory adapted to hold contemporaneously data representing multiple still picture images (see step 310 in fig. and col. 4, lines 50 to 52 and "video system 100 is capable of displaying video images on monitor 108 during capture and compression preprocessing", see col. 4, lines 8 to 10).

Since all features of claim 1 are considered to be disclosed in document D1, the requirements with respect to novelty are not met for the subject-matter claimed in claim 1 (Art. 33(2) EPC). The same objection applies likewise against method claim 16.

2. Claims 2 to 15:

The additional features of claim 2 to 15 are either known from the prior art documents cited in the International Search Report or generally known in the technical field of image decoding and display and the inclusion of such features is regarded as part of the customary praxis the skilled person would consider in accordance with circumstances.

Hence, the subject-matter of claims 2 to 15 is not considered to be novel or does not involve an inventive step as required by Articles 33(2) and (3) PCT.

**Section VII:**

When a new set of claims is filed the applicants should ensure that at least the independent apparatus claim is drafted in the correct two-part form with all the features of the closest prior art document (at present document D1) being comprised in the generic part of the claim (Rule 6.3(b)(i) PCT) and with the remaining features being included in a characterising part (Rule 6.3(b)(ii) PCT).

**Section VIII:**

Claims 17 and 18:

Since claims 17 and 18 do not contain any technical features, the subject-matter for which protection is sought is considered to be vague and therefore unclear. Therefore, claims 17 and 18 in their present form cannot be allowed because of lack of clarity (Art. 6 PCT).

**Miscellaneous:**

The Applicant is requested to file amendments by way of replacement pages in the manner stipulated by Rule 66.8(a) PCT. In particular, fair copies of the amendments should be filed preferably in triplicate.

In order to facilitate the examination of the conformity of the amended application with the requirements of Article 34(2)(b) PCT, the Applicant is invited to clearly identify the amendments carried out, no matter whether they concern amendments by addition, replacement or deletion, and to indicate the passages of the application as filed on which these amendments are based (see also Rule 66.8(a) PCT).

If the Applicant regards it as appropriate these indications could be submitted in handwritten form on a copy of the relevant parts of the application as filed.

The Applicant's attention is drawn to the fact that, as a consequence of Rule 66.8(a) PCT the examiner is not permitted to carry out any amendments under the PCT procedure, however minor these may be.



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TX 523 656 epmu d  
FAX +49 89 2399-4465

Europäisches  
Patentamt

Generaldirektion 2

European  
Patent Office

Directorate General 2

Office européen  
des brevets

Direction Générale 2

## Correspondence with the EPO on PCT Chapter II demands

In order to ensure that your PCT Chapter II demand is dealt with as promptly as possible you are requested to use the enclosed self-adhesive labels with any correspondence relating to the demand sent to the Munich Office.

One of these labels should be affixed to a prominent place in the upper part of the letter or form etc. which you are filing.

# PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

## PCT

NOTIFICATION OF TRANSMITTAL OF  
THE INTERNATIONAL SEARCH REPORT  
OR THE DECLARATION

(PCT Rule 44.1)

To:

MATHYS & SQUIRE  
Attn. COZENS, P.  
100 Gray's Inn Road  
London WC1X 8AL  
UNITED KINGDOM

Date of mailing  
(day/month/year)

11/05/1999

Applicant's or agent's file reference

PDC/AB/20432

**FOR FURTHER ACTION**

See paragraphs 1 and 4 below

International application No.

PCT/IB 99/00288

International filing date  
(day/month/year)

08/02/1999

Applicant

CANAL+ SOCIETE ANONYME et al.

1. ☒ The applicant is hereby notified that the International Search Report has been established and is transmitted herewith.

**Filing of amendments and statement under Article 19:**

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

**When?** The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

**Where?** Directly to the International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland  
Facsimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no International Search Report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Further action(s):** The applicant is reminded of the following:

Shortly after 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

Within 19 months from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within 20 months from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the International Searching Authority



European Patent Office, P.B. 5818 Patentlaan 2  
NL-2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Hans Pettersson

## NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the PCT Applicant's Guide, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions respectively.

### INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only.

#### What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

#### When?

Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

#### Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

#### How?

Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

#### What documents must/may accompany the amendments?

##### Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.



## NOTES TO FORM PCT/ISA/220 (continued)

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

- (i) the claim is unchanged;
- (ii) the claim is cancelled;
- (iii) the claim is new;
- (iv) the claim replaces one or more claims as filed;
- (v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:  
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."
2. [Where originally there were 15 claims and after amendment of all claims there are 11]:  
"Claims 1 to 15 replaced by amended claims 1 to 11."
3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:  
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or  
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."
4. [Where various kinds of amendments are made]:  
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

### "Statement under article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international application is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

### Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the same time of filing the amendments with the International Bureau, also file a copy of such amendments with the International Preliminary Examining Authority (see Rule 62.2(a), first sentence).

### Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, where upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see Volume II of the PCT Applicant's Guide.

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>PDC/AB/20432</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/IB 99/ 00288</b>	International filing date (day/month/year) <b>08/02/1999</b>	(Earliest) Priority Date (day/month/year) <b>16/02/1998</b>
Applicant <b>CANAL+ SOCIETE ANONYME et al.</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

## 1. Basis of the report

- a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing:

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☐ filed together with the international application in computer readable form.

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☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

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2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (see Box II).

## 4. With regard to the title,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

## 5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

## 6. The figure of the drawings to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

5

☐ None of the figures.

## INTERNATIONAL SEARCH REPORT

National Application No

PCT/IB 99/00288

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 H04N7/00 H04N7/50 G09G1/16 H04N7/52

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 H04N G09G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 633 654 A (KENNEDY JR HOWARD J ET AL) 27 May 1997	1,2
Y	see column 3, line 45 - column 4, line 59; figure 3 see column 6, line 24 - line 35 ---	3,4
Y	WO 98 00976 A (THOMSON CONSUMER ELECTRONICS ;SUN MICROSYSTEMS INC (US)) 8 January 1998 see page 9, line 16 - page 11, line 3 see page 15, line 13 - page 16, line 5 see page 17, line 6 - page 18, line 25 ---	3,4
A	WO 97 02700 A (PHILIPS ELECTRONICS NV ;PHILIPS NORDEN AB (SE)) 23 January 1997 see page 11, line 5 - page 12 --- -/--	1

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

30 April 1999

Date of mailing of the international search report

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Name and mailing address of the ISA

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## INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB 99/00288

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 622 774 A (MICROSOFT CORP) 2 November 1994 see abstract	2
A	WO 96 37074 A (PHILIPS ELECTRONICS NV ;PHILIPS NORDEN AB (SE)) 21 November 1996 see abstract	1-16

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/IB 99/00288

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US 5633654	A	27-05-1997	NONE		
WO 9800976	A	08-01-1998	AU	3648797 A	21-01-1998
			EP	0909513 A	21-04-1999
WO 9702700	A	23-01-1997	AU	6013896 A	05-02-1997
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			JP	10503358 T	24-03-1998
			US	5815604 A	29-09-1998

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**PROCESSING OF DIGITAL PICTURE DATA IN A DECODER**

The present invention relates to a decoder for a digital audiovisual transmission system, the decoder comprising a processor means for decompressing and displaying  
5 compressed digital picture data and a memory means.

Broadcast transmission of digital data is well-known in the field of pay TV systems, where scrambled audiovisual information is sent, usually by a satellite or satellite/cable link, to a number of subscribers, each subscriber possessing a decoder capable of  
10 descrambling the transmitted program for subsequent viewing. Terrestrial digital broadcast systems are also known. Recent systems have used the broadcast link to transmit other data, in addition to or as well as audiovisual data, such as computer programs or interactive applications.

15 In the most basic level of functionality of such systems, digital audio and video data relating to the televised program is transmitted in a compressed format, for example, in accordance with the MPEG-2 compression standard. The decoder receives and decompresses this data in order to regenerate the televised program.

20 In addition to simple televised program data, it is becoming increasingly common for the decoder to be required to handle other compressed image or graphic data. For example, in the case where the decoder includes web browser capabilities, the processor of the decoder may be required to receive and decompress downloaded digital picture data, for example, still video pictures, graphic icons etc. This picture  
25 information may be displayed over the normal televised program images.

Such still or moving picture data may be typically received in one of any number of compressed formats that are currently used in the context of PC based web browsers. For example, a picture may be formatted and compressed according to the well-known  
30 GIF or PNG standards, where an image is described by a colour look-up table defining a table of colours and a matrix of pixel values referring to this table, the matrix data being compressed according to a known compression procedure to prepare the

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GIF/PNG picture. Alternatively, the picture may be formatted and compressed as a still MPEG or JPEG image, in which each pixel is directly associated with a red/green/blue colour value.

- 5 It is an object of the present invention to provide a means of efficiently handling such downloaded still picture files.

According to the present invention, there is provided a decoder for a digital audiovisual transmission system, the decoder including a processor for decompressing and displaying compressed still picture data and a memory, characterised in that the  
10 memory comprises a storage memory allocated to receive from the processor decompressed data representing a plurality of still picture images, and at least one display memory adapted to hold data representing multiple still picture images readable by the processor prior to display, the data representing the plurality of still  
15 picture images being copied from the storage memory to the display memory for subsequent display.

This division of the memory into a storage and display memory areas introduces a degree of flexibility into the display of still image data, in particular by permitting  
20 data representing a given still picture image to be held at the same time in both the storage and display means. Data representing one or more still pictures may be held indefinitely in the storage memory as long as there is a possible requirement for this data, even after the picture has been removed from the screen by deletion of the data from the display memory.

25 In some instances, decompressed image data may simply be copied "as is" into the display memory. However, in some cases, the digital image data copied from the storage memory into the display memory is modified or duplicated during the copying step, for example, in order to resize the digital image or to copy the same image a  
30 number of times into the display memory.

Preferably, the processor means is adapted to process image data in the display



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memory as one layer amongst a plurality of layers superimposed one over the other when displayed.

As discussed above, picture data may be superimposed in a higher layer over, for example, audiovisual information representing normal televised images. However, in one embodiment, the image data in the display memory may be displayed in a layer normally used by the processor means to display broadcast audiovisual information. This may be the case, for example, where the decoder switches from a "television" mode, in which a broadcast emission is displayed, to a "web browser" mode, in which downloaded picture data from the internet is displayed in place of normal televised programmes.

Advantageously, the memory comprises a second display memory readable by the graphic processor means and corresponding to a second layer of displayed image data, data being copied from the storage memory to the second display memory for subsequent display in the second layer of image data.

Again, as before, the digital image data copied from the storage memory to the second display memory may be modified during the copying step.

In one embodiment, for example, where the decoder switches between a television and browser mode, the image data in the second display memory may be displayed in the lowermost background layer normally used by the processor means to display broadcast still audiovisual information.

Preferably, partial image data is copied from the storage memory to a display memory under the control of an application running within the decoder so as to permit display of part of an image. This may be desirable, for example, where the decompression and downloading of an image into the storage memory by the processor proceeds in a number of stages.

In one embodiment, image data is copied from the storage memory into a first or

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second display memory under control of a high level application running in the processor. Alternatively, this process may be handled automatically by a lower level application associated for example with the general handling of received image data.

- 5 Compressed digital picture data is preferably stored in a buffer memory prior to decompression by the processor. It is not necessary that this buffer means be a single integral block of memory particularly if the data arrives in a number of blocks of information. In particular, in one embodiment, the buffer comprises a plurality of buffer memory elements. Each memory element may correspond, for example to a  
10 block of data downloaded in the decoder.

Preferably, the decompression and transfer of image data from the buffer memory elements to the storage memory, and from the storage memory to a display memory, is controlled by the processor such that image information present in the storage  
15 memory is transferred to the display memory at the end of the decompression of the contents of each buffer element.

It may be the case, for example, that information corresponding to one image will be spread over a number of buffer elements. As each buffer is emptied and  
20 decompressed, the information ready for display is transferred immediately to the display memory, enabling a partial display of the complete image.

In addition, or alternatively, the decompression and transfer of a group of images in a single image file from the buffer memory to the storage memory, and from the  
25 storage memory to a display memory, is controlled by the processor such that image information is transferred from the storage memory to the display memory at the end of the decompression of each image in the image file.

As discussed above, image data may be sent in any number of formats. In one  
30 embodiment, the processor is adapted to decompress picture data sent in a compression standard, such as GIF or PNG, that uses a colour look-up table.

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In addition or alternatively, the processor is adapted to decompress picture data sent in a compression standard, such MPEG or JPEG, that uses a red/blue/green colour value associated with each pixel.

5 All functions of decompression, display etc. may be integrated in a single processor. Alternatively, the processor in the decoder need not necessarily be embodied in a single chip but may be divided, for example, into a general processor handling data decompression and a graphic processor for preparing the decompressed data for display.

10

Similarly, whilst the application may refer to a storage memory, a display memory etc. it is to be understood that these need not correspond to physically separate memory devices (RAM, ROM, FLASH, etc.) but may correspond to one or more areas allocated for this purpose by a controlling application and divided between one or  
15 more physical memory devices.

20

The present invention has been discussed above in relation to a decoder apparatus. The present invention equally extends to a method of digital image processing within a decoder, corresponding to the general and preferred aspects of the invention discussed above.

25

In the context of the present application the term "digital audiovisual transmission system" refers to all transmission systems for transmitting or broadcasting primarily audiovisual or multimedia digital data. Whilst the present invention is particularly applicable to a broadcast digital television system, the present invention may equally be used in filtering data sent by a fixed telecommunications network for multimedia internet applications etc.

30

Similarly, the term "decoder" is used to apply to an integrated receiver/decoder for receiving and decrypting an encrypted transmission, the receiver and decoder elements of such a system as considered separately, as well as to a receiver capable of receiving non-encrypted broadcasts. The term equally covers decoders including additional

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functions, such as web browsers, together with decoders integrated with other devices, for example, integrated VHS/decoder devices, digital televisions, or the like.

The term MPEG refers to the data transmission standards developed by the International Standards Organisation working group "Motion Pictures Expert Group" and notably the MPEG-2 standard developed for digital television applications and set out in the documents ISO 13818-1, ISO 13818-2, ISO 13818-3, and ISO 13818-4. In the context of the present patent application, the term includes all variants, modifications or developments of the basic MPEG formats applicable to the field of digital data transmission.

There will now be described, by way of example only, a preferred embodiment of the present invention, with reference to the attached figures, in which:

Figure 1 shows an overview of a digital television system;

Figure 2 shows the elements of the receiver/decoder of Figure 1;

Figure 3 shows a block diagram of the computer system of the receiver/decoder;

Figure 4 shows in layer form the image data processed by the graphic processor of Figure 2;

Figure 5 shows the operations carried out in memory for picture data to be displayed in the MPEG layer of Figure 4; and

Figure 6 shows the operations carried out in memory for the partial display of picture data in the MPEG layer.

An overview of a digital television system 1 according to the present invention is shown in Figure 1. The invention includes a mostly conventional digital television system 2 that uses the known MPEG-2 compression system to transmit compressed

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digital signals. In more detail, MPEG-2 compressor 3 in a broadcast centre receives a digital signal stream (typically a stream of video signals). The compressor 3 is connected to a multiplexer and scrambler 4 by linkage 5.

5 The multiplexer 4 receives a plurality of further input signals, assembles the transport stream and transmits compressed digital signals to a transmitter 6 of the broadcast centre via linkage 7, which can of course take a wide variety of forms including telecommunications links. The transmitter 6 transmits electromagnetic signals via uplink 8 towards a satellite transponder 9, where they are electronically processed and  
10 broadcast via notional downlink 10 to earth receiver 12, conventionally in the form of a dish owned or rented by the end user. The signals received by receiver 12 are transmitted to an integrated receiver/decoder 13 owned or rented by the end user and connected to the end user's television set 14. The receiver/decoder 13 decodes the compressed MPEG-2 signal into a television signal for the television set 14.

15

Other transport channels for transmission of the data are of course possible, such as terrestrial broadcast, cable transmission, combined satellite/cable links, telephone networks etc.

20 In a multichannel system, the multiplexer 4 handles audio and video information received from a number of parallel sources and interacts with the transmitter 6 to broadcast the information along a corresponding number of channels. In addition to audiovisual information, messages or applications or any other sort of digital data may be introduced in some or all of these channels interlaced with the transmitted digital  
25 audio and video information.

A conditional access system 15 is connected to the multiplexer 4 and the receiver/decoder 13, and is located partly in the broadcast centre and partly in the decoder. It enables the end user to access digital television broadcasts from one or  
30 more broadcast suppliers. A smartcard, capable of deciphering messages relating to commercial offers (that is, one or several television programmes sold by the broadcast supplier), can be inserted into the receiver/decoder 13. Using the decoder 13 and

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smartcard, the end user may purchase commercial offers in either a subscription mode or a pay-per-view mode.

5 As mentioned above, programmes transmitted by the system are scrambled at the multiplexer 4, the conditions and encryption keys applied to a given transmission being determined by the access control system 15. Transmission of scrambled data in this way is well known in the field of pay TV systems. Typically, scrambled data is transmitted together with a control word for descrambling of the data, the control word itself being encrypted by a so-called exploitation key and transmitted in  
10 encrypted form.

The scrambled data and encrypted control word are then received by the decoder 13 having access to an equivalent of the exploitation key stored on a smart card inserted in the decoder to decrypt the encrypted control word and thereafter descramble the  
15 transmitted data. A paid-up subscriber will receive, for example, in a broadcast monthly ECM (Entitlement Control Message) the exploitation key necessary to decrypt the encrypted control word so as to permit viewing of the transmission.

An interactive system 16, also connected to the multiplexer 4 and the receiver/decoder  
20 13 and again located partly in the broadcast centre and partly in the decoder, enables the end user to interact with various applications via a modem back channel 17. The modem back channel may also be used for communications used in the conditional access system 15. An interactive system may be used, for example, to enable the viewer to communicate immediately with the transmission centre to demand  
25 authorisation to watch a particular event, download an application etc.

Referring to Figure 2, the elements of the receiver/decoder 13 or set-top box adapted to be used in the present invention will now be described. The elements shown in this figure will be described in terms of functional blocks.

30 The decoder 13 comprises a central processor 20 including associated memory elements and adapted to receive input data from a serial interface 21, a parallel

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interface 22, a modem 23 (connected to the modem back channel 17 of Fig 1), and switch contacts 24 on the front panel of the decoder.

The decoder is additionally adapted to receive inputs from an infra-red remote control 25 via a control unit 26 and also possesses two smartcard readers 27, 28 adapted to read bank or subscription smartcards 29, 30 respectively. The subscription smartcard reader 28 engages with an inserted subscription card 30 and with a conditional access unit 29 to supply the necessary control word to a demultiplexer/descrambler 30 to enable the encrypted broadcast signal to be descrambled. The decoder also includes a conventional tuner 31 and demodulator 32 to receive and demodulate the satellite transmission before being filtered and demultiplexed by the unit 30.

Processing of data within the decoder is generally handled by the central processor 20. The software architecture of the central processor corresponds to a virtual machine interacting via an interface layer with a lower level operating system implemented in the hardware components of the decoder. This will now be described with reference to Figure 3.

For the purposes of this description, an application is a piece of computer code for controlling high level functions of the receiver/decoder 13. For example, when the end user positions the focus of a remote controller on a button object seen on the screen of the television set and presses a validation key, the instruction sequence associated with the button is run.

An interactive application proposes menus and executes commands at the request of the end user and provides data related to the purpose of the application. Applications may be either resident applications, that is, stored in the ROM (or FLASH or other non-volatile memory) of the receiver/decoder 13, or broadcast and downloaded into the RAM or FLASH memory of the receiver/decoder 13.

Applications are stored in memory locations in the receiver/decoder 13 and represented as resource files. The resource files comprise graphic object description unit files,

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variables block unit files, instruction sequence files, application files and data files.

The receiver/decoder contains memory divided into a RAM volume, a FLASH volume and a ROM volume, but this physical organization is distinct from the logical organization. The memory may further be divided into memory volumes associated with the various interfaces. From one point of view, the memory can be regarded as part of the hardware; from another point of view, the memory can be regarded as supporting or containing the whole of the system shown apart from the hardware.

Referring to Figure 3, the computer system can be regarded as centred on a run time engine 40 forming part of a virtual machine 41. This is coupled to applications on one side (the "high level" side), and, on the other side (the "low level" side), via various intermediate logical units discussed below, to the receiver/decoder hardware 42. The receiver/decoder hardware can be regarded as including various ports corresponding to the functional blocks discussed in relation to Figure 2 (the interface 26 for the handset 25, the MPEG stream interface 30, the serial interface 21, the parallel interface 22, the interfaces to the card readers 27, 28, and the interface 23 to the modemmed back channel 17).

Various applications 43 are coupled to the virtual machine 41. Some of the more commonly used applications may be more or less permanently resident in the system, as indicated at 44, while others will be downloaded into the system, eg from the MPEG data stream or from other ports as required.

The virtual machine 41 includes, in addition to the run time engine 40, some resident library functions 45 which include a toolbox 46. The library contains miscellaneous functions in C language used by the engine 40. These include data manipulation such as compression, expansion or comparison of data structures, line drawing, etc. The library 45 also includes information about device drivers 49 in the firmware of the receiver/decoder, such as hardware and software version numbers and available RAM space, and a function used when downloading a new device 47. Functions can be downloaded into the library and stored in FLASH or RAM memory.



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The run time engine 40 is coupled to a device manager 48 which is coupled to a set of devices 47 which are coupled to device drivers 49 which are in turn coupled to the ports or interfaces. In broad terms, a device driver can be regarded as defining a logical interface, so that two different device drivers may be coupled to a common physical port. A device will normally be coupled to more than one device driver; if a device is coupled to a single device driver, the device will normally be designed to incorporate the full functionality required for communication, so that the need for a separate device driver is obviated. Certain devices may communicate among themselves.

As will be described below, there are three forms of communication from the devices 47 up to the run time engine: by means of variables, buffers, and events which are passed to a set of event queues.

Each function of the receiver/decoder is represented as a device 47. Devices can be either local or remote. Local devices include smartcards, SCART connector signals, modems, serial and parallel interfaces, a MPEG video and audio player and an MPEG section and table extractor. Remote devices executed in a remote location, differ from local devices in that a port and procedure must be defined by the system authority or designer, rather than by a device and device driver provided and designated by the receiver/decoder manufacturer.

The run time engine 40 runs under the control of the microprocessor and a common application programming interface. They are installed in every receiver/decoder so that all receiver/decoders are identical from the application point of view.

The engine 40 runs applications 43 on the receiver/decoder. It executes interactive applications and receives events from outside the receiver/decoder, displays graphics and text, calls devices for services and uses functions of the library 45 connected to the engine 40 for specific computation.

The run time engine 40 is an executable code installed in each receiver/decoder, and

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includes an interpreter for interpreting and running applications. The engine is adaptable to any operating system, including a single task operating system (such as MS-DOS). The engine is based on process sequencer units (which take various events such as a key press, to carry out various actions), and contains its own scheduler to manage event queues from the different hardware interfaces. It also handles the display of graphics and text. A process sequencer unit comprises a set of action-groups. Each event causes the process sequencer unit to move from its current action-group to another action-group in dependence on the character of the event, and to execute the actions of the new action-group.

The engine 40 comprises a code loader to load and download applications 43 into the receiver/decoder memory. Only the necessary code is loaded into the RAM or FLASH memory, in order to ensure optimal use. The downloaded data is verified by an authentication mechanism to prevent any modification of an application 43 or the execution of any unauthorized application. The engine 40 further comprises a decompressor. As the application code (a form of intermediate code) is compressed for space saving and fast downloading from the MPEG stream or via a built-in receiver/decoder mode, the code must be decompressed before loading it into the RAM. The engine 40 also comprises an interpreter to interpret the application code to update various variable values and determine status changes, and an error checker.

Before using the services of any device 47, a program (such as an application instruction sequence) has to be declared as a "client", that is, a logical access-way to the device 47 or the device manager 48. The manager gives the client a client number which is referred to in all accesses to the device. A device 47 can have several clients, the number of clients for each device 47 being specified depending on the type of device. A client is introduced to the device 47 by a procedure "Device: Open Channel". This procedure assigns a client number to the client. A client can be taken out of the device manager 48 client list by a procedure "Device: Close Channel".

The access to devices 47 provided by the device manager 48 can be either synchronous or asynchronous. For synchronous access, a procedure "Device: Call" is

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used. This is a means of accessing data which is immediately available or a functionality which does not involve waiting for the desired response. For asynchronous access, a procedure "Device: I/O" is used. This is a means of accessing data which involves waiting for a response, for example scanning tuner frequencies to find a multiplex or getting back a table from the MPEG stream. When the requested result is available, an event is put in the queue of the engine to signal its arrival. A further procedure "Device: Event" provides a means of managing unexpected events.

As noted above, the main loop of the run time engine is coupled to a variety of process sequencer units, and when the main loop encounters an appropriate event, control is temporarily transferred to one of the process sequencer units.

Thus, it can be seen that the computer system implemented in the processor provides a platform having considerable flexibility in enabling an application to communicate with a variety of devices.

Returning to Figure 2, the processing of sound and image data by each of the associated processors will now be described in detail. In the case of received audio and video signals, the MPEG packets containing these signals will be demultiplexed and filtered so as to pass real time audio and video data in the form of a packetised elementary stream (PES) of audio and video data to dedicated audio and video processors or decoders 33, 34. The converted output from the audio processor 33 passes to a preamplifier 35 and thereafter via the audio output of the receiver/decoder. The converted output from the video processor 34 passes via a graphic processor 36 and PAL/SECAM encoder 37 to the video output of the receiver/decoder. The video processor may be of a conventional type, such as the ST 3520 A of SGS Thomson.

The graphic processor 36 additionally receives graphic data for display (such as generated images etc) from the central processor 20 and combines this information with information received from the video processor 34 to generate a screen display combining moving images together with overlaid text or other images. An example

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of a graphic processor adapted to carry out this sort of operation is the CL 9310 of C-CUBE.

5 In the case of received teletext and/or subtitle data, the conversion of the real time PES data to generate the appropriate images may also be handled by dedicated processors. However, in most conventional systems, this is handled by the general processor 20.

10 In point of fact, many of functions associated with the elements such as the graphic processor 36, video decoder 34, central processor 20 etc. may be combined or divided out in a number of ways, e.g. to integrate the central and graphic processors to form a single processor means etc.

15 Referring now to Figure 4, the functionality of the graphic processor 36 will now be described. As discussed above, the graphic processor receives and processes real time video data from the video decoder 34 together with graphic data received from the general processor 20 in order to generate an overlaid screen display.

20 As shown in Figure 4, the graphic processor 36 is adapted to process input data divided into four distinct layers; a background layer 50, an MPEG layer 51, a graphic layer 52 and a cursor layer 53. As will be understood, the background layer 50 corresponds to the lowest layer of the screen display, the other layers being progressively superimposed with varying degrees of translucency or opacity over this layer.

25

In the case where the decoder is configured to display a broadcast video signal, the background and MPEG layers 50, 51 correspond to the stream of data received from the video decoder 34, the layer 50 corresponding to MPEG still pictures received from the decoder 34 and the layer 51 corresponding to a moving video MPEG signal  
30 received from the decoder. The division of a video signal into a fixed and a changing part is a known characteristic of MPEG compression.

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Other configurations of the decoder are possible, for example, where the background and MPEG layers 50, 51 are completed by picture data in any number of formats received from the processor 20. For example, in the case where the decoder is acting in web browser configuration, the processor 20 may supply still and/or moving picture data to complete the layers 50, 51. The layer 50 may equally correspond, for example, to a background colour and the layer 51 to one or more windows displayed over the background and containing, for example, information, moving icons or the like. The operation of the system in handling picture data will be discussed in more below with reference to Figures 5 and 6.

Still and moving image data from the background and MPEG layers 50, 51 are mixed together by the graphic processor 36, as represented by the element 54, and a combined output provided. Mixing of the MPEG layer information 51 over the background layer 50 by the graphic processor may be carried out using a so-called alpha blending factor to permit a greater or lesser degree of translucency of the pixels in the MPEG layer image. In the case of a moving video image received from the video decoder 34, the same blending factor is used for all pixels within the video sequence. In the case of picture data from the central processor 20, the value of the blending factor for the layer 51 may be different for different parts of the screen.

The graphic layer 52 is used for texts, shapes, icons etc that will be displayed on the screen over the images taken from the layers 50, 51, for example, to permit display of a moving icon or the like generated by the processor 20 over a real-time video sequence taken from the video decoder 34.

In a similar manner to the blending carried out for the layers 50, 51, the element 55 carries out a blending of the graphic layer 52 with the combined output of the layers 50, 51. Different regions within the graphic layer 52 may be assigned a different blending factor and a corresponding different level of translucency depending on the characteristics of the data within each region.

A final layer, the cursor layer, is shown at 53 and represents an opaque cursor image,

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generated by hardware under control of the central processor 20 and superimposed over all the previous layers. As shown at 56, this layer is combined with the summed output from the combination of all previous layers to generate a final combined output 57 sent to the encoder 37 for subsequent display. Unlike the previous layers, the cursor presents a continuously opaque appearance and is superimposed over the combined layers without any blending.

Referring to Figures 5 and 6, the operation of a device 47 of the kind shown in Figure 3 and adapted to decompress and display downloaded picture images in the MPEG layer 51 will now be described. In the following description, the term picture is used to describe a compressed digital image. Typically, the sorts of picture formats used may include MPEG still picture, JPEG format picture, PNG format picture, GIF format picture, etc.

Whilst the following description will concentrate on the processing and display of a single picture, a sequence of still pictures may be displayed one after the other in order to generate a moving image sequence.

Referring to Figure 5, downloaded compressed picture data 60, 61, 62 is initially stored in a buffer section of the RAM memory of the decoder indicated at 63. This buffer memory may be of a type initialised and managed by a high level application 43 responsible for decoding and displaying images, or an area of memory handled by the device manager 48 shown in Figure 3.

Each type of picture file or group of picture files includes a header indicating the picture file format (GIF, MPEG, etc.) as well as the information needed to decompress the picture file. For example, a GIF format file 62 comprising more than one picture has a global header describing the size of the overall area where the two decompressed images will be displayed and a specific header for each picture describing its size and location coordinates within the overall area.

Following downloading of a compressed picture into the buffer section 63 of the

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memory, a decompression of the picture data will be effected by the device in response to a command PICTURE\_DECOMPRESS received from the application. The subsequently decompressed image data 63, 64, 65 is stocked in a separate storage section of the RAM memory indicated at 66 and reserved for image data eventually  
5 to be displayed in the MPEG layer. Each decompressed image or image sequence is given an image identity reference Id1, Id2, Id3 by the device, this ID value being supplied to the high level application and used for all subsequent operations to be carried out on this data.

10 Unlike the compressed picture data temporarily held in the application buffer 63, the decompressed image data 63, 64, 65 may be held indefinitely in the storage memory 66 until such time as the application decides to delete the information.

The storage of decompressed image data in a distinct assigned memory area permits  
15 the data to be manipulated in a number of ways prior to display. For example, a resizing of the image may be carried out, either by the device itself, the device manager or by a higher level application. Equally, the image may be duplicated in order to be displayed at a number of positions on the screen. Conversion of colour data associated the image, for example to compensate for limitations in the  
20 functionality of the graphic processor, may also be carried out on the image.

Modified or unmodified data stored in the memory 66 is passed, in response to a command PICTURE\_DISPLAY from the application, into a separate RAM memory section 67 assigned for images to be displayed in the MPEG layer 51 (see Figure 2).  
25 The size of the display memory 67 corresponds to the screen area. As shown, the images Id1 and Id2 are displayed at 68 and 69, whilst the image or sequence of images Id3 is duplicated and displayed at the positions 70, 71. The information in the memory section 67 is fed to the graphic processor 36 in order to create the MPEG layer 51, as shown in Figure 2.

30

In addition to the transfer of image information between the storage area 66 and display area 67, a second transfer may also be carried out to copy information held in

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the storage area 66 into a memory area (not shown) associated with the display of images in the background layer 40 of Figure 2. For example, a single image may be replicated and displayed a number of times in the background layer in order to cover the screen in a tiling manner. The information stored in the memory area associated with the background layer is accessed by the graphic processor in the same manner as the MPEG display area 67.

As will be understood, the memory sections 63, 64, 65 do not need to physically correspond to uninterrupted memory zones in a single RAM or other memory element.

In particular, the memory area 63 may be divided between a number of buffers. Figure 6 shows the steps associated with the decompression of a file 80 containing two compressed pictures 81, 82 previously downloaded into four associated buffer elements or lists of buffers 83, 84, 85, 86.

Each buffer list corresponds to the buffer areas in which a block of data has been downloaded from the MPEG stream. The buffer list itself may designate a number of separate buffer areas depending on availability as the information is downloaded.

At step 87, the application sends a PICTURE\_DECOMPRESS command 87 to start the decompression process. The device allocates a group image Id and starts read the buffers. Once the start of a picture is found at step 88, the device assigns an image Id and starts decompression of the image. At step 89, the end of the first buffer list is reached and the application sends a PICTURE\_ADD\_DATA command at step 90 to command the device to read the next buffer list in the series.

At this point, only part of the image of the first picture 81 has been decompressed and stored in the memory storage area 66. The application may nevertheless decide to immediately transfer the partial image to the display memory area 67.

The decompression of the remaining part of the picture 81 then continues until the start of the next picture is found at 91. At this point, the whole of the first picture 81 has been decompressed and stored in the memory area 66. The application may then



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update the contents of the display memory area 67 by copying the complete image into the display area 67. In this way, the whole of the first picture 81 may be displayed before the second picture has been decompressed.

- 5     At step 92, the device informs the application of the end of the second buffer list 84 and the application sends a second PICTURE\_ADD\_DATA command 93 to start the reading of the next buffer list 85. The process is repeated at the end of the third buffer list 85 and beginning of the fourth buffer list 86 by the steps 94, 95. Again, each time the end of a buffer is reached at 92, 94, the application may copy the data
- 10    that has already been decompressed from the storage area 66 into the display area 67.

- At step 96, the end of the file is reached and both the pictures 81, 82 have been decompressed and loaded into the storage memory 66. At this point, the device informs the application of the successful decompression of the whole file and the
- 15    application again copies the contents of the storage memory 66 into the display memory 67 to display the complete set of pictures.

**CLAIMS**

1. A decoder for a digital audiovisual transmission system, the decoder including a  
5 processor for decompressing and displaying compressed still picture data and a  
memory, characterised in that the memory comprises a storage memory allocated to  
receive from the processor decompressed data representing a plurality of still picture  
images, and at least one display memory adapted to hold contemporaneously data  
representing multiple still picture images readable by the processor prior to display,  
10 the data representing the plurality of still picture images being copied from the storage  
memory to the display memory for subsequent display.
2. A decoder as claimed in claim 1 in which the digital image data copied from the  
storage memory into the display memory is modified or duplicated during the copying  
15 step.
3. A decoder as claimed in claim 1 or 2 in which the processor is adapted to process  
image data in the display memory as one layer amongst a plurality of layers  
superimposed one over the other when displayed.  
20
4. A decoder as claimed in claim 3 in which the processor is adapted to display the  
image data in the display memory in a layer normally used by the processor means to  
display broadcast audiovisual information.
- 25 5. A decoder as claimed in any preceding claim in which the memory comprises a  
second display memory readable by the processor means and corresponding to a  
second layer of displayed image data, data being copied from the storage memory to  
the second display memory for subsequent display in the second layer of image data.
- 30 6. A decoder as claimed in claim 5 in which the digital image data copied from the  
storage memory to the second display memory is modified or duplicated during the  
copying step.

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7. A decoder as claimed in any preceding claim, in which partial image data is copied from the storage memory to a display memory so as to permit display of part of an image.

5 8. A decoder as claimed in any preceding claim, in which image data is copied from the storage memory into a first or second display memory under control of a high level application running on the processor.

9. A decoder as claimed in any preceding claim, in which compressed digital picture  
10 data is stored in a buffer memory means prior to decompression by the processor.

10. A decoder as claimed in claim 9, in which the buffer means comprises a plurality of buffer memory elements.

15 11. A decoder as claimed in claim 10, in which the decompression and transfer of image data from the buffer memory elements to the storage memory, and from the storage memory to a display memory, is controlled by the processor such that image information present in the storage memory is transferred to the display at the end of the decompression of the contents of each buffer element.

20 12. A decoder as claimed in any preceding claim, in which the decompression and transfer of a group of images in a single image file from the buffer memory to the storage memory, and from the storage memory to a display memory, is controlled by the processor means such that image information is transferred from the storage  
25 memory to the display memory at the end of the decompression of each image in the image file.

13. A decoder as claimed in any preceding claim, in which the processor is adapted to decompress picture data sent in a compression standard that uses a colour look-up  
30 table.

14. A decoder as claimed in any preceding claim, in which the processor is adapted

to decompress picture data sent in a compression standard that uses a red/blue/green colour value associated with each pixel.

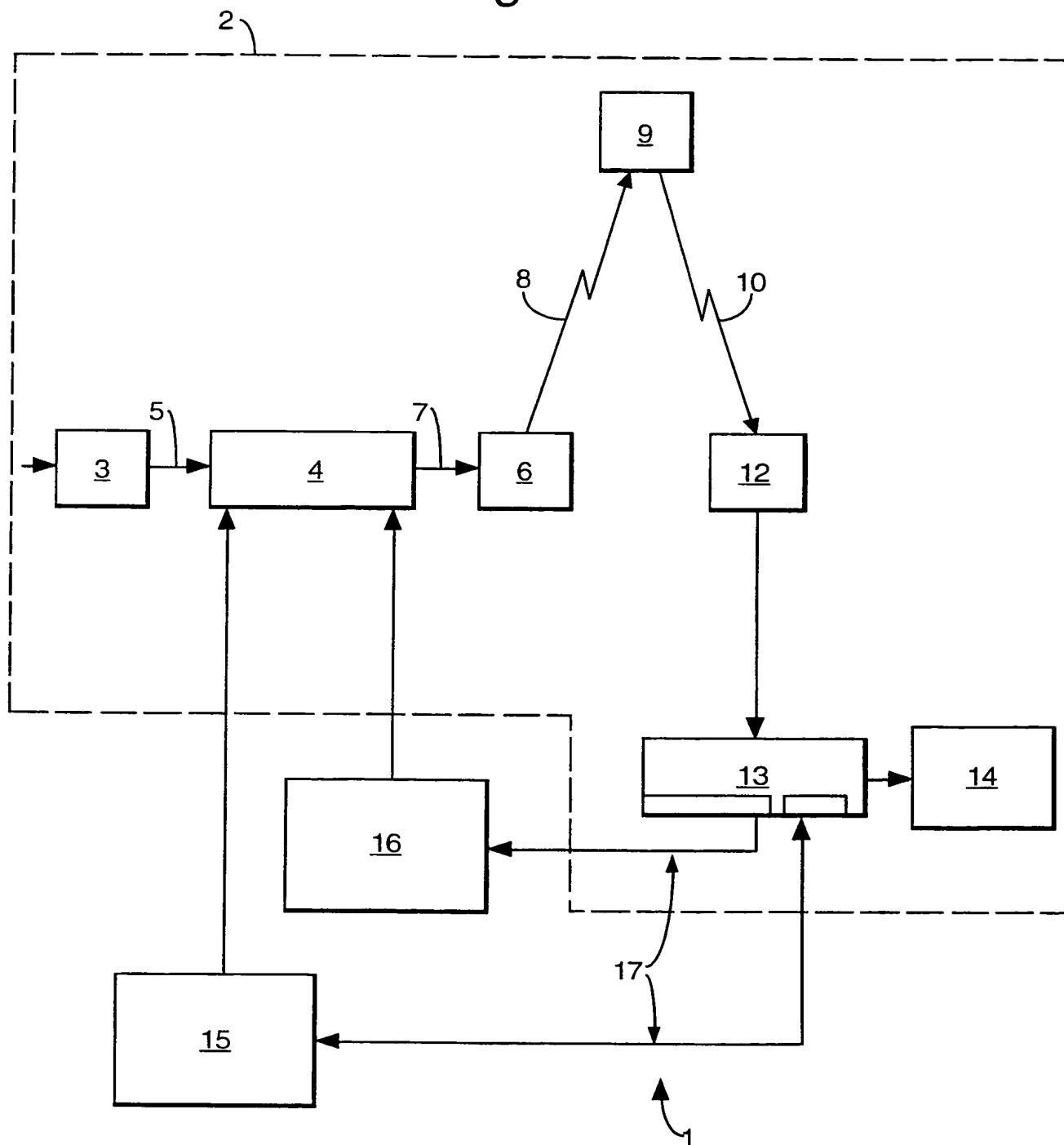
5 15. A decoder as claimed in any preceding claim in which the processor comprises a general processor for decompressing digital picture data and a graphic processor for preparing the decompressed data for display.

10 16. A method of digital image processing in a decoder for a digital audiovisual transmission system, the decoder comprising a processor for decompressing and displaying compressed still picture data characterised in that decompressed digital image data representing a plurality of still picture images received from the processor is transmitted to a storage memory and thereafter copied from the storage memory to a display memory which holds contemporaneously data representing said multiple picture images, the data being read by the processor for subsequent display of such  
15 multiple picture images.

17. A decoder for a digital audiovisual transmission system substantially as herein described.

20 18. A method of digital image processing in a decoder for a digital audiovisual transmission system substantially as herein described.

Fig.1.



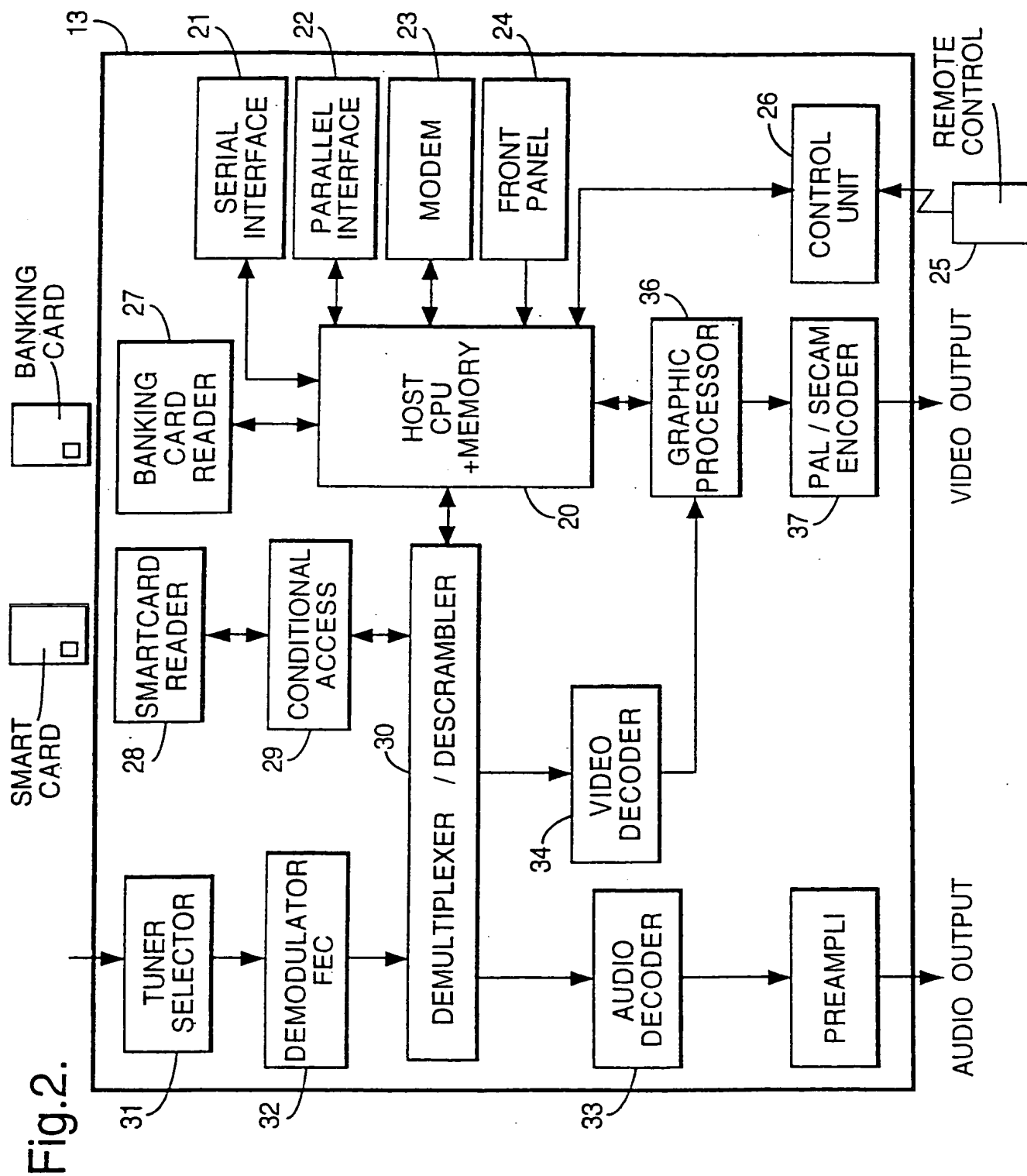
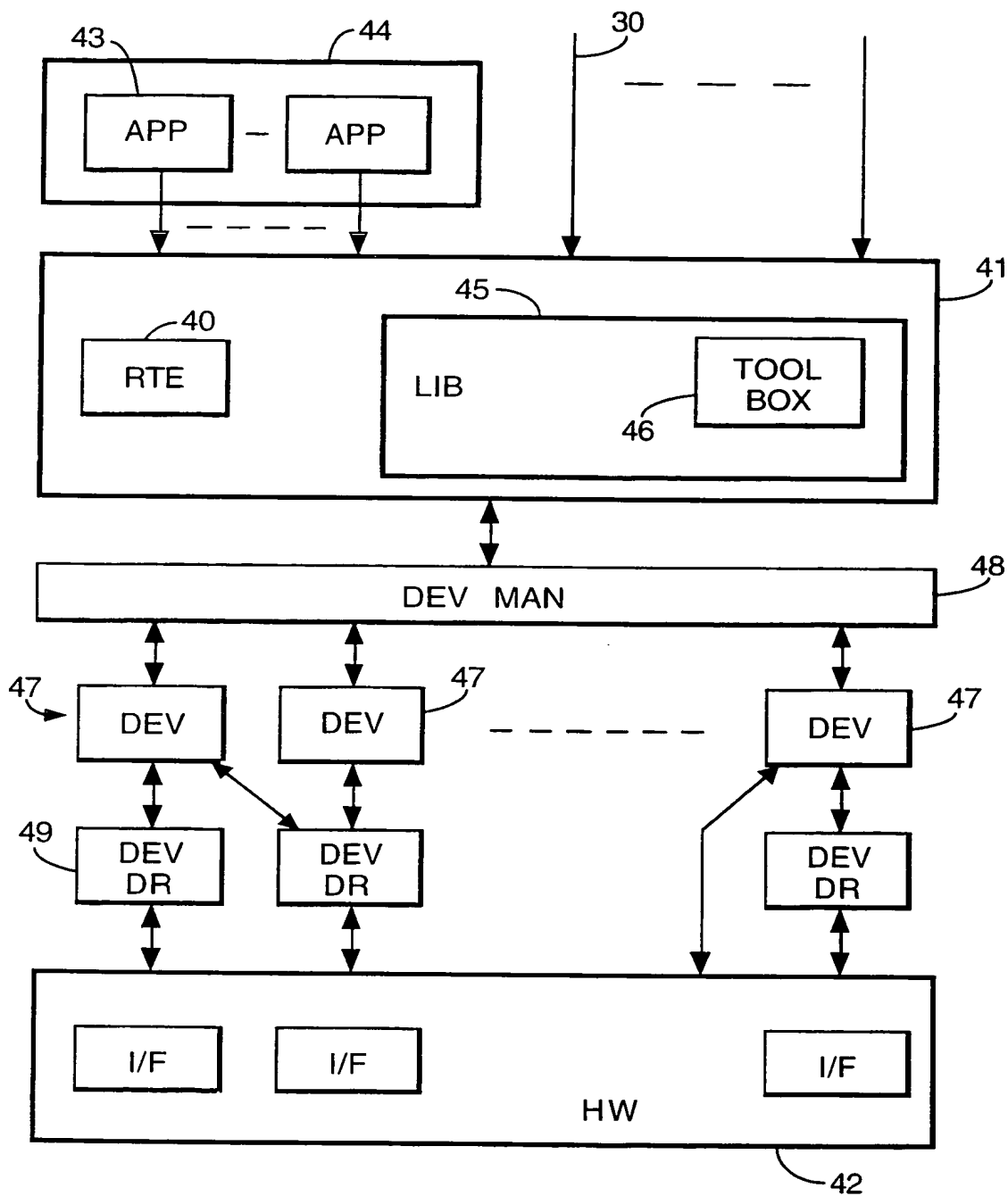


Fig.3.



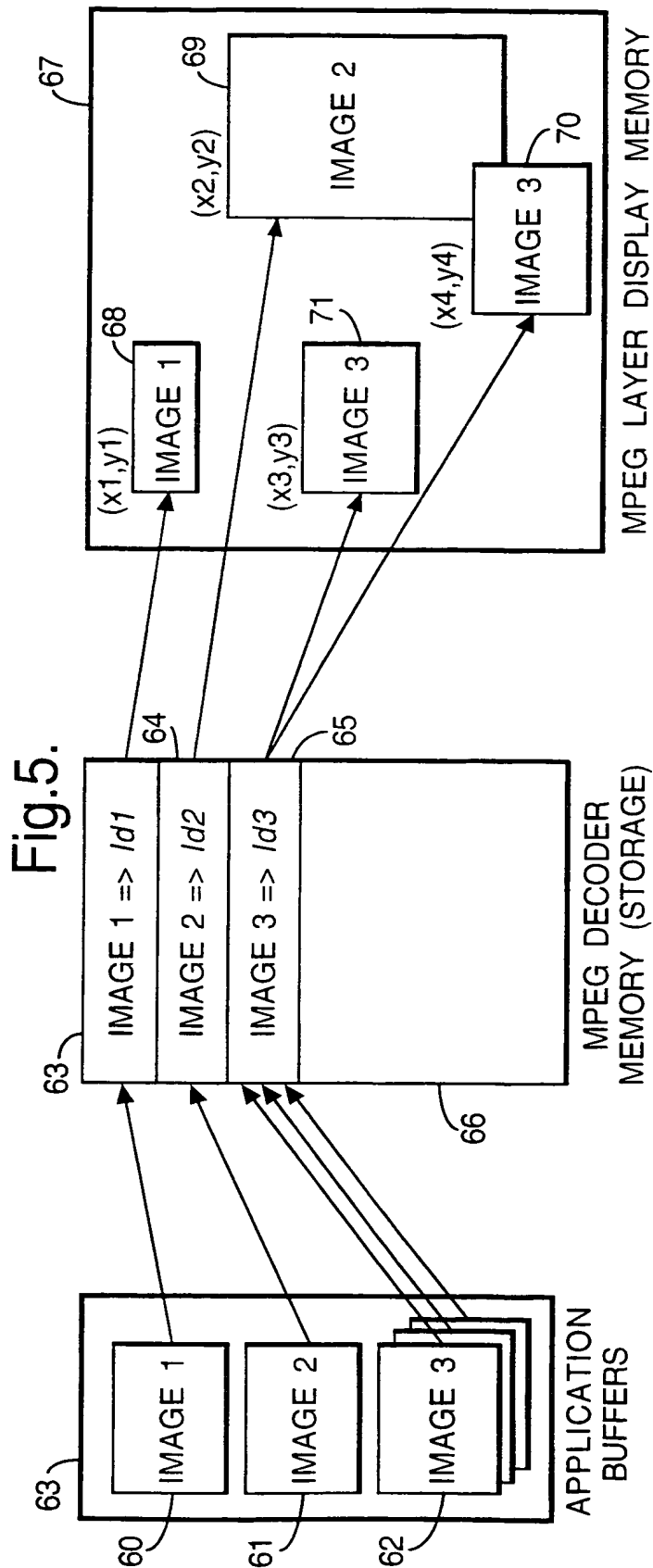
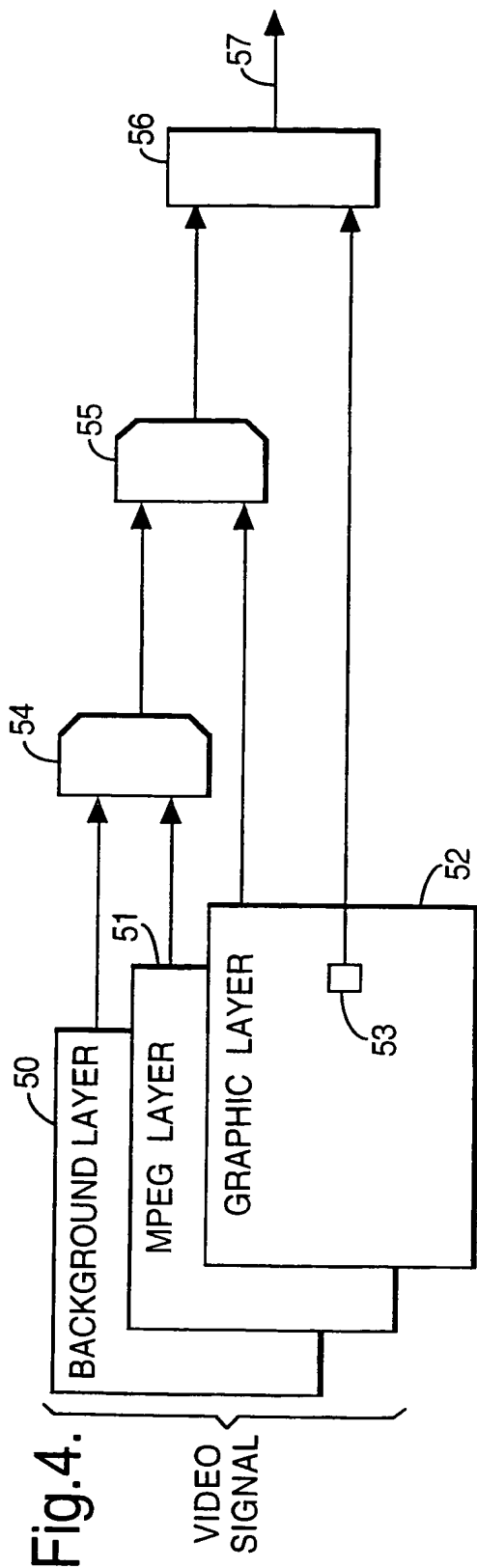
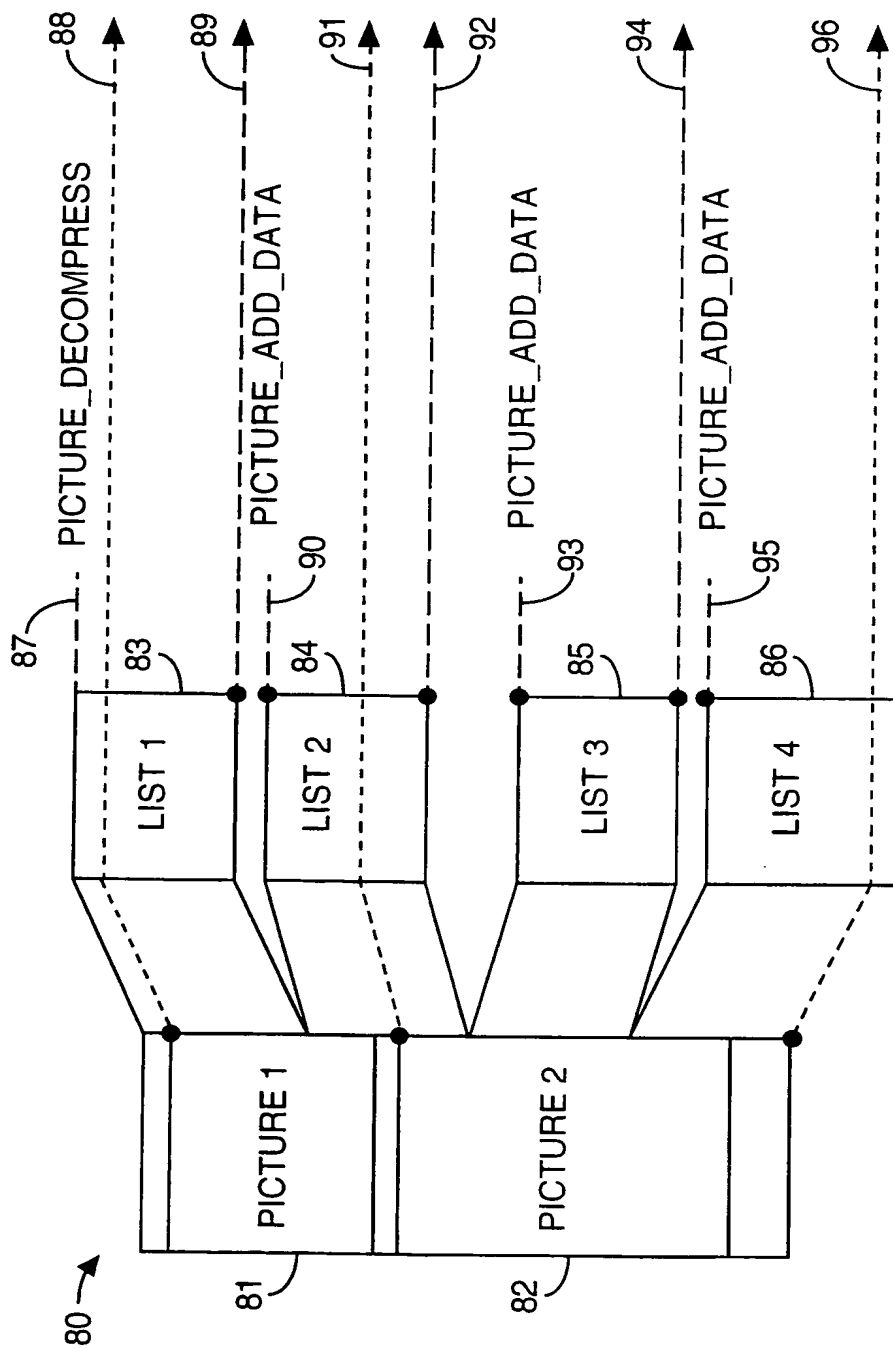




Fig.6.



# INTERNATIONAL SEARCH REPORT

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**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 633 654 A (KENNEDY JR HOWARD J ET AL) 27 May 1997	1,2
Y	see column 3, line 45 - column 4, line 59; figure 3 see column 6, line 24 - line 35 ---	3,4
Y	WO 98 00976 A (THOMSON CONSUMER ELECTRONICS ;SUN MICROSYSTEMS INC (US)) 8 January 1998 see page 9, line 16 - page 11, line 3 see page 15, line 13 - page 16, line 5 see page 17, line 6 - page 18, line 25 ---	3,4
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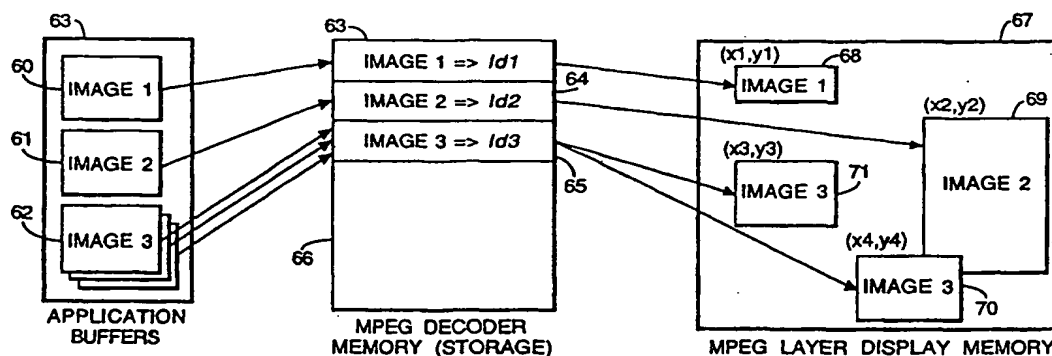
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(54) Title: PROCESSING OF DIGITAL PICTURE DATA IN A DECODER



(57) Abstract

A decoder for a digital audiovisual transmission system, the decoder comprising a processor means for decompressing and displaying compressed still picture data and a memory (66, 67) characterised in that the memory (66, 67) comprises a storage memory (66) allocated to receive from the processor decompressed digital image data representing a plurality of still picture images (63, 64, 65) and at least one display memory (67) adapted to hold contemporaneously data representing multiple still picture images (68, 69, 70, 71) readable by the processor means prior to display, data representing the plurality of images being copied from the storage memory (66) to the display memory (67) for subsequent display.

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